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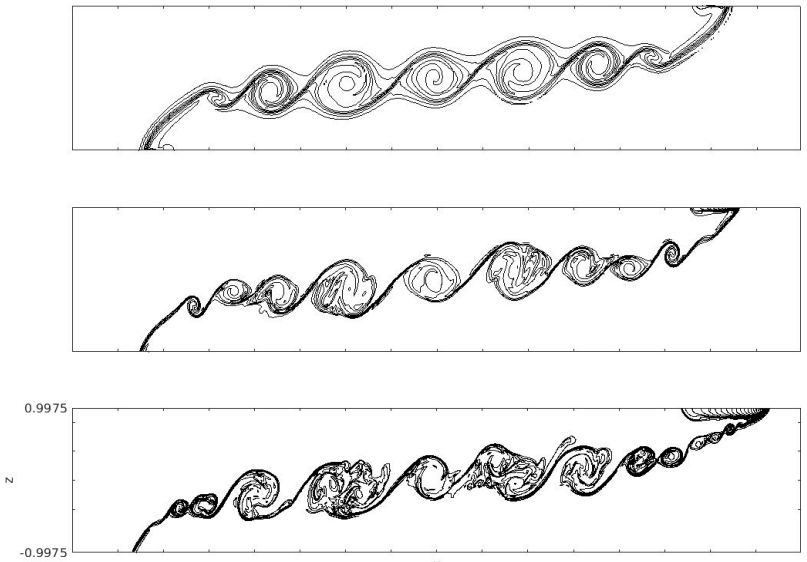
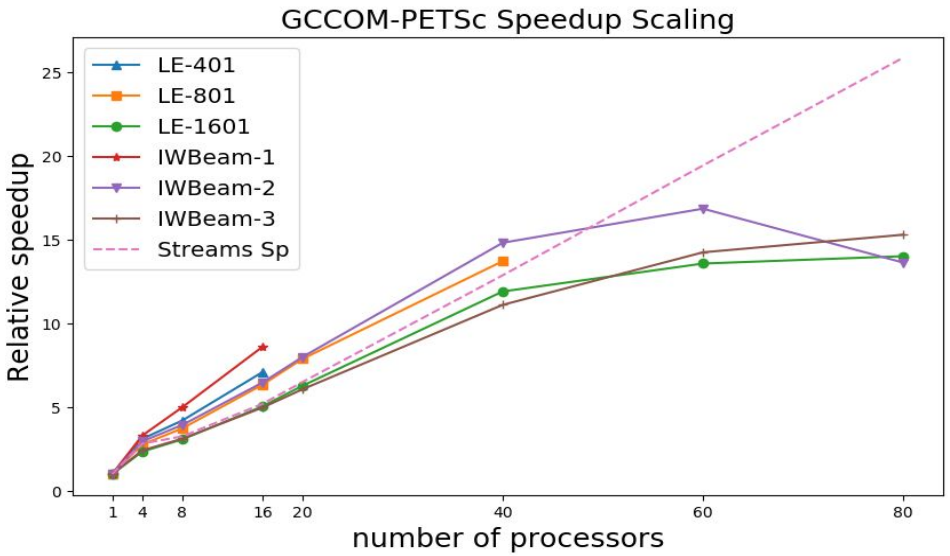
Main Research Task:

- Parallelize a Coastal Ocean Dynamics model (GCCOM) with PETSc:
  - Data arrays distribution and Linear System solver
  - Validate against serial version
  - Carry out performance tests

Goal:

- Be able to run field-scale experiments on the model:
  - Internal waves and Bores in underwater canyons on the West Coast (Monterey Bay (CalPoly) and La Jolla Canyon (Scripps / UCSD))





M. Valera, *et al*, "Parallel Implementation of a PETSc-based Framework for the General Curvilinear Coastal Ocean Model", Journal of Computational Geosciences. *Submitted.*

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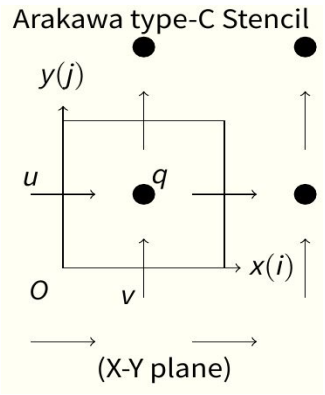

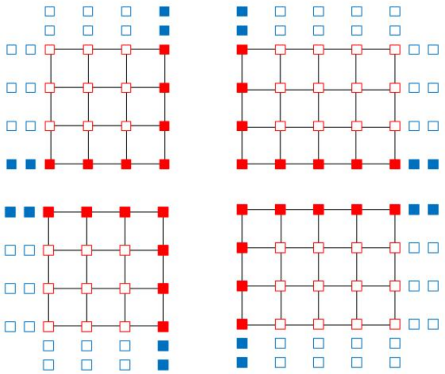

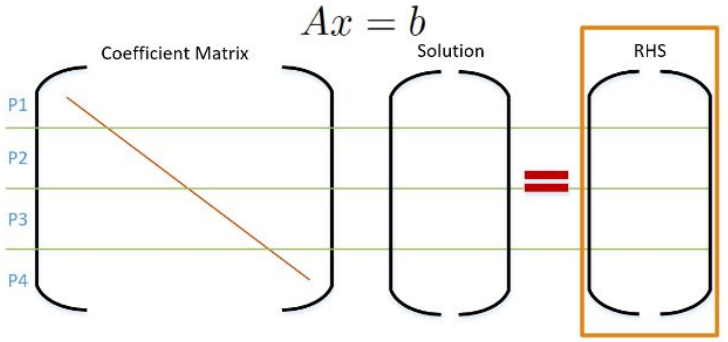

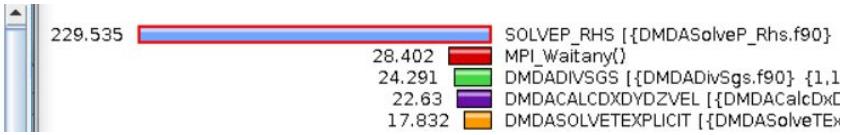

Challenges:

- No previous knowledge or residing expert in PETSc
- Arakawa-C type grid
- Full 3D curvilinear transformation meshes
- Unique transformed Laplacian (56% of time)
- Modules for advection, dispersion, turbulence, thermodynamics, and so on.
- Moving into MPI/GPU Hybrid implementation.